

## Appendix B3 – System/Component Cause Codes

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### NUCLEAR UNITS INDEX TO SYSTEM/COMPONENT CAUSE CODES

(Unit Codes 200-299)

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## NUCLEAR REACTOR

This set of codes contains the following:

- The reactor
- The containment system
- The reactor coolant system, including chemical, volume, and pressure control system
- Safety systems, both electrical and mechanical
- Residual heat removal systems
- Closed loop cooling water for reactor systems
- Service water for closed loop cooling and other reactor systems
- Steam generators
- Main steam systems up to the outboard containment isolation valve
- Feedwater systems from the reactor or steam generator up to the outboard containment isolation valve
- Blowdown systems
- Radioactive waste and off-gas systems

**Core/Fuel**

- 2010 Fuel failure, including high activity in Reactor Coolant System (RCS) or off-gas system
- 2020 Control rod pattern changes and control rod repatch. (Preconditioning following a pattern change is to be reported using code 2031.)
- 2021 Power limited by rod pattern. (If rod pattern is limited by fuel limits, use appropriate code below.)
- 2030 Fuel limits - peaking factors
- 2031 Fuel preconditioning
- 2032 Fuel limits - MCPR (Minimum Critical Power Ratio - BWR units only)
- 2033 Fuel limits - MAPLHGR (Maximum Average Planar Linear Heat Generation Rate - BWR units only)
- 2034 Core tilt restrictions
- 2035 Core xenon restrictions
- 2036 End-of-life scram reactivity/rod worth restrictions
- 2037 Other fuel limits (use codes 9110 and 9120 for core coastdown, conservation, or stretch)
- 2040 Core physics tests
- 2050 Burnable poison problems including poison curtains
- 2060 Excore nuclear instrumentation
- 2061 Incore nuclear instrumentation
- 2062 Other fuel/core related instrumentation problems
- 2070 Normal refueling
- 2071 Refueling equipment problems
- 2072 Fuel storage
- 2080 Fueling machine and auxiliaries (CANDU)
- 2082 Fuel transfer problems (CANDU)
- 2090 Other core/fuel problems

**Control Rods and Drives**

- 2110 Control rod drive motors
- 2111 Control rod magnetic jack drives
- 2112 Control rod hydraulic drives
- 2120 Control rod scram mechanisms
- 2125 Reactivity control units (CANDU)
- 2130 Control rod assemblies other than drive and scram mechanisms
- 2140 Control rod drive cooling
- 2150 Control rod instrumentation
- 2151 Control rod drive controls
- 2152 Control rod drive power supplies
- 2155 Control rod testing
- 2160 Other control rod drive problems

### **Reactor Vessel and Internals**

- 2170 Reactor vessel flanges and seals
- 2171 Reactor vessel nozzles
- 2172 Feedwater sparges
- 2173 Jet pumps
- 2174 Core support
- 2175 Specimen holders
- 2176 Control rod guides (not in fuel)
- 2180 Calandria and Calandria tubes (CANDU)
- 2185 Coolant assemblies (pressure tubes) (CANDU)
- 2199 Other reactor vessel problems

### **Reactor Coolant System**

#### **Pumps**

- 2200 Reactor coolant/recirculating pumps
- 2210 Reactor coolant/recirculating pump motors
- 2220 Reactor coolant/recirculating pump MG sets

#### **Piping**

- 2230 Reactor coolant system piping
- 2240 Reactor coolant system pipe supports
- 2250 Reactor coolant system filters and strainers
- 2260 Reactor coolant flanges, fittings, and manways

#### **Pressurizer**

- 2265 Pressurizer (also see codes 2290, 2330, and 2340)

#### **Valves**

- 2270 Power operated relief and safety/relief valves
- 2280 Non-power operated safety valves
- 2290 Pressurizer spray valves
- 2300 Recirculation loop flow control valves
- 2320 Other reactor coolant valves (including RCS boundary valves in connected systems)

#### **Instruments and Controls**

- 2330 Pressurizer level instruments and controls
- 2340 Pressurizer pressure instruments and controls
- 2350 BWR feedwater controls
- 2360 BWR pressure controls
- 2370 Reactor trip system including sensors, logic, and actuators (includes spurious trips but not valid trips)
- 2380 Reactor control system/integrated control system problems
- 2390 Other reactor coolant system instruments and controls

**Miscellaneous (Reactor Coolant System)**

2399 Other miscellaneous reactor coolant system problems

**Steam Generators and Steam System**

2400 Steam generator tube leaks  
2411 Steam generator tube inspections  
2412 Steam generator tube supports  
2420 Steam generator moisture separators and dryers  
2421 Steam generator feedwater nozzles  
2422 Other steam generator internals problems  
2430 Steam generator shell  
2431 Steam generator flanges, manways, and fittings  
2432 Steam generator supports and snubbers  
2440 Steam generator chemistry (excluding feedwater chemistry)  
2441 Steam generator tube lancing  
2442 Steam generator chemical cleaning  
2443 Steam generator modifications  
2450 Blowdown system piping  
2460 Blowdown system valves  
2470 Blowdown system instruments and controls  
2480 Other blowdown  
2500 Steam piping (up to turbine stop valves and bypass valves)  
2510 Main steam isolation valves (BWR and PWR)  
2515 Main steam isolation valve testing  
2520 Main steam safety/relief valves  
2521 Main steam safety/relief valve testing  
2530 Atmospheric or condenser dump valves (not SRVs)  
2540 Other steam valves  
2550 Steam generator instruments (including piping and valves) (no RPS or SAS inputs)  
2560 Steam generator controls  
2599 Other steam generator problems

**Core Cooling/Safety Injection**

(where portions of these systems also serve in the makeup system, report problems as CVCS problems)

2600 High pressure safety injection, core injection, or core spray pumps (including RCIC)  
2601 Motors for high pressure pumps  
2602 Steam turbine drives for high pressure pumps (including RCIC)  
2603 High pressure piping  
2604 High pressure valves  
2609 Other high pressure injection problems  
2620 Low pressure safety injection, core spray, or decay heat pumps  
2621 Motors for low pressure pumps  
2622 Low pressure piping  
2623 Low pressure valves  
2624 Low pressure heat exchangers  
2625 Accumulators (up to and including check valves)

- 2628 Residual heat removal/decay heat removal system
- 2629 Other low pressure problems
- 2630 Safeguard actuation system (including sensors, logic, activators, and sequencers)
- 2649 Other emergency core cooling/residual heat removal system problems

### **Electrical Safety Systems**

- 2650 Emergency diesel generators (including actuating systems)
- 2651 Emergency diesel generator output breakers
- 2660 Safeguard buses and associated equipment (transformers, breakers, etc.)
- 2670 DC safety system power supplies
- 2680 120V AC safety system power supplies (including inverter)
- 2699 Other electrical safety system power supplies (use codes 3600 to 3659 for nonsafety electrical systems)

### **Containment System**

- 2700 Containment structure
- 2701 Containment liner
- 2702 Containment hatches
- 2703 Containment penetrations
- 2720 Containment isolation valves and dampers
- 2730 Containment isolation actuation
- 2740 Containment penetration pressurization system
- 2750 Containment hydrogen control system (vents, recombiners, etc.)
- 2760 Containment spray system (including actuation)
- 2770 Containment cooling system - normal
- 2771 Containment cooling and gas cleanup - post accident
- 2780 Containment testing
- 2799 Other containment system problems

### **Chemical and Volume Control/Reactor Water Cleanup**

- 2805 Moderator systems (CANDU)
- 2806 Moderator purification (CANDU)
- 2807 Moderator poison injection (CANDU)
- 2810 Makeup pumps
- 2811 Boric acid transfer pumps
- 2812 Tanks
- 2813 Demineralizers
- 2814 Filters
- 2815 Heat exchangers
- 2816 Valves and piping
- 2817 Instruments and controls
- 2819 Other CVCS and RWC problems

### **Nuclear Cooling Water Systems**

- 2820 Nuclear closed cooling water pumps
- 2821 Nuclear closed cooling water piping
- 2822 Nuclear closed cooling water valves
- 2823 Nuclear closed cooling heat exchanger
- 2825 Turbine building closed cooling water system
- 2829 Other closed cooling water system problems
- 2830 Nuclear service water pumps
- 2831 Nuclear service water piping
- 2832 Nuclear service water valves
- 2833 Nuclear service water heat exchangers
- 2839 Other service water problems

### **Auxiliary Systems (see codes 3110 to 3999 for other auxiliary systems)**

- 2840 Auxiliary feedwater pumps
- 2841 Auxiliary feedwater pump motors
- 2842 Auxiliary feedwater pump steam turbines (including steam control valves)
- 2843 Auxiliary feedwater piping
- 2844 Auxiliary feedwater valves
- 2849 Other auxiliary feedwater problems
- 2870 Radioactive liquid waste system problems
- 2880 Radioactive gas and waste system problems
- 2890 Condenser off-gas system problems

### **Miscellaneous (Reactor)**

- 2900 Reactor overhaul (use for non-specific overhaul only; see page B-FS-2)
- 2990 Plant radiation levels
- 2991 Radioactivity discharge levels to the environment
- 2995 Reactor performance testing (use code 9999 for total unit performance testing)
- 2999 Other miscellaneous nuclear reactor problems

## **BALANCE OF PLANT**

### **Condensing System**

#### **Condenser Tubes**

- 3110 Condenser tube leaks
- 3111 Condenser tube fouling shell side
- 3112 Condenser tube fouling tube side
- 3113 Condenser tube and water box cleaning (including circulating water flow reversal)
- 3114 Air-cooled condenser tubes
- 3115 Air-cooled condenser pumps
- 3116 Air-cooled condenser fans
- 3117 Air-cooled condenser fan motors
- 3118 Other Air-cooled condenser problems
- 3119 Other condenser tube casing or shell and internal problems

### Condenser Casing or Shell and Internals

- 3120 Tube sheets
- 3121 Expansion joint
- 3122 Gaskets and seals
- 3123 Hot well
- 3124 Tube sheet fouling
- 3129 Other condenser casing or shell and internal problems

### Vacuum Equipment

- 3130 Air ejectors
- 3131 Air ejector piping and valves
- 3132 Inter and after condensers
- 3133 Vacuum pumps
- 3134 Vacuum pump piping and valves
- 3135 Vacuum pump motor and auxiliaries
- 3139 Other air extraction system problems - general
- 3149 Loss of vacuum not attributable to a particular component such as air ejectors or valves. Also high back pressure not attributable to high circulating water temperature or vacuum losses from a known cause.

### Condenser Controls

- 3150 Hot well level controls
- 3151 Vacuum pump and air ejector controls
- 3152 Air-cooled condenser controls
- 3159 Other condensing system controls and instruments

### Miscellaneous (Condensing System)

- 3170 Condenser inspection (use code 3110 to report looking for tube leaks)
- 3171 Air-cooled condenser inspections
- 3180 Major condenser overhaul
- 3185 Water side cathodic protection
- 3190 Air leakage (for losses not attributable to previously noted equipment related codes)
- 3199 Other miscellaneous condensing system problems



### **Circulating Water Systems**

- 3210 Circulating water pumps
- 3211 Circulating water pump motors
- 3220 Circulating water piping
- 3221 Circulating water piping fouling
- 3230 Circulating water valves
- 3231 Waterbox
- 3232 Condenser tube cleaning system including debris filter
- 3233 Circulating water priming system
- 3235 Cooling tower booster pump
- 3236 Cooling tower booster motor
- 3238 Cooling tower fan motors
- 3239 Cooling tower fan motors - variable speed
- 3240 Cooling tower fans
- 3241 Cooling tower efficiency below design
- 3242 Cooling tower fill damage
- 3243 Cooling tower icing
- 3244 Cooling tower fires
- 3245 Other cooling tower problems
- 3246 Cooling tower fouling
- 3247 Cooling tower instrumentation
- 3250 Circulating water system instruments and controls
- 3260 Traveling screens
- 3261 Traveling screen fouling
- 3269 Circulating water biological conditions (ie, zebra mussels)
- 3270 Intake system problems other than traveling screens
- 3271 Intake grating fouling
- 3272 Circulating water screenwash system
- 3273 Debris in circulating water from outside sources (leaves, mud, etc.)
- 3274 Ice blockages at intake structures including frazil ice, sheets, blocks of ice, etc.
- 3280 High circulating water temperature (not due to season, tower efficiency below design, or other listed equipment problem)
- 3281 Circulating water tempering system
- 3282 Circulating water cooling ponds
- 3285 Circulating water chemistry

### **Waste Water (zero discharge) Systems**

- 3290 Waste water (zero discharge) tanks, pumps and motors
- 3291 Waste water (zero discharge) system fouling
- 3292 Waste water (zero discharge) piping
- 3293 Waste water (zero discharge) valves
- 3294 Waste water (zero discharge) controls and instrumentation
- 3295 Other waste water (zero discharge) problems
- 3299 Other circulating water system problems

## Condensate System

### **Pumps, Piping, and Valves**

- 3300 Condensate water pre-treatment
- 3310 Condensate/hotwell pumps
- 3311 Condensate/hotwell pump motor
- 3312 Condensate booster pump
- 3313 Condensate booster pump motor
- 3314 Condensate booster pump motor - variable speed
- 3315 Condensate booster pump drive (other than 3313 and 3314)
- 3320 Condensate piping
- 3330 Condensate valves

### **Low/Intermediate Pressure Heater and Deaerators**

- 3339 LP heater head leaks
- 3340 LP heater tube leaks
- 3341 Other LP heater – general
- 3342 IP heater tube leaks
- 3343 Other IP heater – general
- 3344 Deaerator (including level control)
- 3345 IP heater head leaks

### **Polishers/Chemical Addition**

- 3350 Condensate polishing and filtering systems
- 3351 Chemical addition systems
- 3352 Feedwater chemistry (not specific to condenser, polishers, or chemical addition)

### **Miscellaneous (Condensate System)**

- 3360 Condensate makeup and return (including storage tanks)
- 3370 Condensate system controls and instrumentation (not hotwell level, heater level, or deaerator level controls: see codes 3150-3159, 3344, 3502.
- 3380 Condensate coolers
- 3399 Other miscellaneous condensate system problems

## Feedwater System

(excluding extraction or drain systems)

- 3401 Startup feedwater pump
- 3402 Startup feedwater pump drives - all types
- 3407 Feedwater pump suction screens
- 3408 Feedwater pump drive – local controls
- 3409 Feedwater pump drive motor - variable speed
- 3410 Feedwater pump
- 3411 Feedwater pump drive - motor
- 3412 Feedwater pump drive - steam turbine

- 3413 Feedwater pump coupling and drive shaft
- 3414 Feedwater pump local controls
- 3415 Feedwater pump/drive lube oil system
- 3416 Other feedwater pump problems
- 3417 Feedwater pump drive - main shaft
- 3418 Feedwater pump drive - other
- 3419 Feedwater pump drive - gear
- 3420 Feedwater piping and supports
- 3430 Feedwater regulating (boiler level control) valve
- 3431 Other feedwater valves
- 3439 HP heater head leaks
- 3440 High pressure heater tube leaks
- 3441 Other high pressure heater problems (see condensate system for LP and IP heater codes)
- 3451 Feedwater booster pump suction screens
- 3452 Feedwater booster pump drive - local controls
- 3453 Feedwater booster pump drive motor - variable speed
- 3454 Feedwater booster pump
- 3455 Feedwater booster pump drive - motor
- 3456 Feedwater booster pump drive - steam turbine
- 3457 Feedwater booster pump coupling and drive shaft
- 3458 Feedwater booster pump local controls
- 3459 Feedwater booster pump/drive lube oil system
- 3460 Other feedwater booster pump problems
- 3461 Feedwater booster pump drive - main shaft
- 3462 Feedwater booster pump drive - other
- 3463 Feedwater booster pump drive - gear
- 3499 Other feedwater system problems

### **Heater Drain Systems**

- 3501 Heater drain pumps
- 3502 Heater level control
- 3503 Heater drain piping
- 3504 Heater drain valves
- 3505 Heater drain pump drive
- 3509 Other heater drain system problems

### **Extraction Steam**

- 3520 HP Extraction steam piping
- 3521 HP Extraction steam valves
- 3522 HP Extraction steam instruments and controls
- 3529 Other HP extraction steam system problems
- 3530 IP Extraction steam piping
- 3531 IP Extraction steam valves
- 3532 IP Extraction steam instruments and controls
- 3539 Other IP extraction steam system problems
- 3540 LP Extraction steam piping
- 3541 LP Extraction steam valves
- 3542 LP Extraction steam instruments and controls
- 3549 Other LP extraction steam system problems

**Electrical (excluding nuclear safety (Class 1E) systems)**

- 3600 Switchyard transformers and associated cooling systems – external (OMC)
- 3601 Switchyard transformers and associated cooling systems – external (not OMC)
- 3610 Switchyard circuit breakers – external (not OMC)
- 3611 Switchyard circuit breakers – external (OMC)
- 3612 Switchyard system protection devices – external (OMC)
- 3613 Switchyard system protection devices – external (not OMC)
- 3618 Other switchyard equipment – external (not OMC)
- 3619 Other switchyard equipment – external (OMC)
- 3620 Main transformer
- 3621 Unit auxiliaries transformer
- 3622 Station service startup transformer
- 3623 Auxiliary generators
- 3624 Auxiliary generator voltage supply system
- 3629 Other switchyard or high voltage system problems - external
- 3630 400-700-volt transformers
- 3631 400-700-volt circuit breakers
- 3632 400-700-volt conductors and buses
- 3633 400-700-volt insulators
- 3634 400-700-volt protection devices
- 3639 Other 400-700-volt problems
- 3640 AC instrument power transformers
- 3641 AC Circuit breakers
- 3642 AC Conductors and buses
- 3643 AC Inverters
- 3644 AC Protection devices
- 3649 Other AC instrument power problems
- 3650 DC instrument power battery chargers
- 3651 DC circuit breakers
- 3652 DC conductors and buses
- 3653 DC protection devices
- 3659 Other DC power problems
- 3660 4000-7000-volt transformers
- 3661 4000-7000-volt circuit breakers
- 3662 4000-7000-volt conductors and buses
- 3663 4000-7000-volt insulators
- 3664 4000-7000-volt protection devices
- 3669 Other 4000-7000-volt problems
- 3670 12-15kV transformers
- 3671 12-15kV circuit breakers
- 3672 12-15kV conductors and buses
- 3673 12-15kV insulators
- 3674 12-15kV protection devices
- 3679 Other 12-15kV problems
- 3680 other voltage transformers
- 3681 other voltage circuit breakers
- 3682 other voltage conductors and buses
- 3683 other voltage insulators
- 3684 other voltage protection devices
- 3689 Other voltage problems
- 3690 Station Service Power Distribution System, General

### **Power Station Switchyard**

- 3700 Powerhouse switchyard (non generating unit equipment)
- 3710 Transmission line (connected to powerhouse switchyard to 1st Substation)
- 3720 Transmission equipment at the 1st substation (see code 9300 if applicable)
- 3730 Transmission equipment beyond the 1st substation (see code 9300 if applicable)

### **Auxiliary Systems**

#### **Open Cooling Water System**

- 3800 Open cooling water pumps and motors
- 3801 Open cooling water piping
- 3802 Open cooling water valves
- 3803 Open cooling water heat exchangers
- 3804 Open cooling water system fouling
- 3805 Open cooling water system instrumentation
- 3806 Open cooling water strainer
- 3809 Other open cooling water problems

#### **Service Water (Open System)**

- 3810 Service water pumps and motors
- 3811 Service water piping
- 3812 Service water valves
- 3813 Service water heat exchangers
- 3814 Service water system fouling
- 3815 Service water strainer
- 3819 Other service water problems

#### **Closed Cooling Water Systems**

- 3820 Closed cooling water pumps
- 3821 Closed cooling water piping
- 3822 Closed cooling water valves
- 3823 Closed cooling water heat exchangers
- 3824 Closed cooling water system fouling
- 3825 Closed cooling water instrumentation
- 3826 Closed cooling water strainer
- 3829 Other closed cooling water system problems

#### **Auxiliary Steam**

- 3830 Auxiliary boiler
- 3831 Auxiliary steam piping
- 3832 Auxiliary steam valves
- 3833 Auxiliary steam controls and instruments
- 3834 Auxiliary boiler tube leaks
- 3835 Auxiliary boiler burner management system
- 3836 Steam transfer to other unit
- 3839 Other auxiliary steam problems (also see extraction steam codes 3520 to 3529; startup bypass codes 0630 to 0660; and soot blower steam code 0870)

**Service Air**

- 3840 Service air compressors
- 3841 Service air piping
- 3842 Service air valves
- 3843 Service air dryers
- 3849 Other service air problems

**Instrument Air**

- 3850 Instrument air compressors
- 3851 Instrument air piping
- 3852 Instrument air valves
- 3853 Instrument air dryers
- 3854 N<sub>2</sub> backup to instrument air
- 3859 Other instrument air problems

**Fire Protection System**

- 3860 Fire protection system pumps
- 3861 Fire protection system piping
- 3862 Fire protection system valves
- 3863 Fire protection system fouling
- 3864 Fire protection system instrumentation and controls
- 3869 Other fire protection system problems

**Seal Air System**

- 3880 Seal air fan
- 3881 Seal air fan drive - motor
- 3882 Seal air control dampers and drives
- 3883 Seal air filters
- 3889 Other seal air fan system problems

**Miscellaneous (Auxiliary Systems)**

- 3898 Miscellaneous plant auxiliary process and services instrumentation and controls
- 3899 Other miscellaneous auxiliary system problems

**Miscellaneous (Balance of Plant)**

- 3950 Process computer
- 3960 Thermal derating (thermal efficiency losses in balance of plant when specific cause(s) unknown)
- 3970 Distributive Control System (DCS) – process computer
- 3971 DCS – data highway
- 3972 DCS – hardware problems (including card failure)
- 3973 DCS – internal and termination wiring
- 3974 DCS – logic problems
- 3975 DCS – upgrades
- 3979 Other DCS problems

- 3980 Programmable Logic Controller (PLC)
- 3981 PLC – data highway
- 3982 PLC – hardware problems (including card failure)
- 3983 PLC – internal and termination wiring
- 3984 PLC – logic problems
- 3985 PLC – upgrades
- 3989 Other PLC problems
- 3995 Powerhouse heating and ventilating systems
- 3996 Air conditioning systems – rooms and areas
- 3998 Balance of plant overhaul/outage
- 3999 Other miscellaneous balance of plant problems

## STEAM TURBINE

Besides the turbine, this set includes the steam stop/control valves, turbine control system, and the turbine auxiliaries. The extraction steam codes are contained in the Balance of Plant set.

### High Pressure Turbine

- 4000 Outer casing
- 4001 Inner casing
- 4009 Nozzle bolting
- 4010 Nozzles and nozzle blocks
- 4011 Diaphragms
- 4012 Buckets or blades
- 4013 Diaphragms unit and shroud type
- 4014 Bucket or blade fouling
- 4015 Wheels or spindles
- 4020 Shaft seals
- 4021 Dummy rings
- 4022 Gland rings
- 4030 Rotor shaft
- 4040 Bearings
- 4041 Thrust bearings
- 4099 Other high pressure turbine problems

### Intermediate Pressure Turbine

- 4100 Outer casing
- 4101 Inner casing
- 4109 Nozzle bolting
- 4110 Nozzles and nozzle blocks
- 4111 Diaphragms
- 4112 Buckets or blades
- 4113 Bucket or blade fouling
- 4115 Wheels or spindles

- 4120 Shaft seals
- 4121 Dummy rings
- 4122 Gland rings
- 4130 Rotor shaft
- 4140 Bearings
- 4141 Thrust bearings
- 4199 Other intermediate pressure turbine problems

### **Low Pressure Turbine**

- 4200 Outer casing
- 4201 Inner casing
- 4209 Nozzle bolting
- 4210 Nozzles and nozzle blocks
- 4211 Diaphragms
- 4212 Buckets or blades
- 4213 Bucket or blade fouling
- 4215 Wheels or spindles
- 4220 Shaft seals
- 4221 Dummy rings
- 4222 Gland rings
- 4230 Rotor shaft
- 4240 Bearings
- 4241 Thrust bearings
- 4250 Other low pressure turbine problems

### **Valves**

- 4260 Main stop valves
- 4261 Control valves
- 4262 Intercept valves
- 4263 Reheat stop valves
- 4264 Combined intercept valves
- 4265 Miscellaneous drain and vent valves
- 4266 Main stop valve testing
- 4267 Control valve testing
- 4268 Reheat/intercept valve testing
- 4269 Other turbine valves

### **Piping**

- 4270 Crossover or under piping
- 4279 Miscellaneous turbine piping



### **Lube Oil**

(Do not include bearing failures due to lube oil)

- 4280 Lube oil pumps
- 4281 Lube oil coolers
- 4282 Lube oil conditioners
- 4283 Lube oil system valves and piping
- 4284 Lube oil pump drive
- 4289 Other lube oil system problems

### **Controls**

- 4290 Hydraulic system pumps
- 4291 Hydraulic system coolers
- 4292 Hydraulic system filters
- 4293 Hydraulic system pipes and valves
- 4299 Other hydraulic system problems
- 4300 Turbine supervisory system (use codes 4290 to 4299 for hydraulic oil)
- 4301 Turbine governing system
- 4302 Turbine trip devices (including instruments)
- 4303 Exhaust hood and spray controls
- 4304 Automatic turbine control systems - mechanical
- 4305 Automatic turbine control systems - mechanical - hydraulic
- 4306 Automatic turbine control systems - electro-hydraulic - analog
- 4307 Automatic turbine control systems - electro-hydraulic - digital
- 4308 Automatic turbine control systems - digital control and monitoring
- 4309 Other turbine instrument and control problems
- 4310 Steam Turbine Control System - data highway
- 4311 Steam Turbine Control System - hardware problems (including card failure)
- 4312 Steam Turbine Control System - internal and termination wiring
- 4313 Steam Turbine Control System - logic problems
- 4314 Steam Turbine Control System - upgrades

### **Miscellaneous (Steam Turbine)**

- 4400 Major turbine overhaul (720 hours or longer ) (use for non-specific overhaul only; see page B-FS-2)
- 4401 Inspection
- 4402 Minor turbine overhaul (less than 720 hours) ) (use for non-specific overhaul only; see page B-FS-2)
- 4410 Turning gear and motor
- 4411 Steam turbine gear box (single shaft configuration)
- 4412 Steam turbine clutch (single shaft configuration)
- 4415 Shaft coupling mechanism
- 4420 Vibration of the turbine generator unit that cannot be attributed to a specific cause such as bearings or blades (use this code for balance moves)
- 4430 Gland seal system
- 4440 Moisture separator/reheater (nuclear including MSR drains, controls, etc.)
- 4445 Steam reheater
- 4450 Water induction

- 4460 Turbine overspeed trip test
- 4470 Differential expansion
- 4490 Turbine performance testing (use code 9999 for total unit performance testing)
- 4499 Other miscellaneous steam turbine problems

## GENERATOR

This set of codes contains the generator, exciter, generator cooling systems, and generator controls. Note the main leads up to and includes the generator output breaker in this set of codes.

### Generator

- 4500 Rotor windings
- 4510 Rotor collector rings
- 4511 Rotor, General
- 4512 Retaining Rings
- 4520 Stator windings, bushings, and terminals
- 4530 Stator core iron
- 4535 Stator, General
- 4536 Generator Heaters
- 4540 Brushes and brush rigging
- 4550 Generator bearings and lube oil system
- 4551 Generator bearings
- 4552 Generator lube oil system
- 4555 Bearing cooling system
- 4560 Generator vibration (excluding vibration due to failed bearing and other components)
- 4570 Generator casing
- 4580 Generator end bells and bolting

### Exciter

- 4600 Exciter drive - motor
- 4601 Exciter field rheostat
- 4602 Exciter commutator and brushes
- 4603 Solid state exciter element
- 4604 Exciter drive - shaft
- 4605 Exciter transformer
- 4609 Other exciter problems

### **Cooling System**

(report failures caused by water leaks into generator as codes 4500, 4510, etc.)

- 4610 Hydrogen cooling system piping and valves
- 4611 Hydrogen coolers
- 4612 Hydrogen storage system
- 4613 Hydrogen seals
- 4619 Other hydrogen system problems
- 4620 Air cooling system
- 4630 Liquid cooling system
- 4640 Seal oil system and seals
- 4650 Other cooling system problems

### **Controls**

- 4700 Generator voltage control
- 4710 Generator metering devices
- 4720 Generator synchronization equipment
- 4730 Generator current and potential transformers
- 4740 Emergency generator trip devices
- 4750 Other generator controls and metering problems

### **Miscellaneous (Generator)**

- 4800 Generator main leads
- 4805 Generator Bus Duct Cooling System
- 4810 Generator output breaker
- 4830 Major generator overhaul (720 hours or longer) (use for non-specific overhaul only; see page B-1)
- 4831 Minor generator overhaul (less than 720 hours) (use for non-specific overhaul only; see page B-1)
- 4840 Inspection
- 4841 Generator dole testing
- 4842 Reactive and capability testing
- 4850 Core monitor alarm
- 4860 Generator neutral grounding equipment
- 4899 Other miscellaneous generator problems

## **EXTERNAL**

Use this set of codes to report events caused by external factors (flood, lightning, etc.); economic factors (lack of fuel, labor strikes, etc.); operator training; and transmission system problems external to the plant.

**Catastrophe**

- 9000 Flood
- 9001 Drought
- 9010 Fire including wildfires, not related to a specific component
- 9020 Lightning
- 9025 Geomagnetic disturbance
- 9030 Earthquake
- 9031 Tornado
- 9035 Hurricane
- 9036 Storms (ice, snow, etc)
- 9040 Other catastrophe

**Economic**

- 0000 Reserve shutdown
- 9110 Core coastdown (nuclear)
- 9120 Core conservation (nuclear)
- 9130 Lack of fuel (water from rivers or lakes, coal mines, gas lines, etc) where the operator is not in control of contracts, supply lines, or delivery of fuels
- 9131 Lack of fuel (interruptible supply of fuel part of fuel contract)
- 9134 Fuel conservation
- 9137 Ground water or other water supply problems
- 9150 Labor strikes company-wide problems or strikes outside the company’s jurisdiction such as manufacturers (delaying repairs) or transportation (fuel supply) problems.
- 9151 Labor strikes direct plant management grievances that result in a walkout or strike are under plant management control.
- 9160 Other economic problems
- 9180 Economic (for internal use at plants only)
- 9181 Economic (for internal use at plants only)
- 9182 Economic (for internal use at plants only)
- 9183 Economic (for internal use at plants only)
- 9184 Economic (for internal use at plants only)
- 9185 Economic (for internal use at plants only)
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- 9197 Economic (for internal use at plants only)
- 9198 Economic (for internal use at plants only)
- 9199 Economic (for internal use at plants only)

### **Miscellaneous (External)**

- 9300 Transmission system problems other than catastrophes (do not include switchyard problems in this category; see codes 3600 to 3629, 3720 to 3730)
- 9310 Operator training
- 9320 Other miscellaneous external problems

## **REGULATORY, SAFETY, ENVIRONMENTAL**

Use these codes only for events not directly attributable to equipment failures. Inspections or testing of certain equipment due to regulation are reported using the appropriate equipment cause codes and the fact that it was a regulatory requirement noted in the verbal description section.

### **Regulatory**

- 9500 Regulatory (nuclear) proceedings and hearings - regulatory agency initiated
- 9502 Regulatory (nuclear) proceedings and hearings - intervener initiated
- 9504 Regulatory (environmental) proceedings and hearings - regulatory agency initiated
- 9506 Regulatory (environmental) proceedings and hearings - intervener initiated
- 9510 Plant modifications strictly for compliance with new or changed regulatory requirements (scrubbers, cooling towers, etc.)
- 9520 Oil spill in Gulf of Mexico (OMC)
- 9590 Miscellaneous regulatory (this code is primarily intended for use with event contribution code 2 to indicate that a regulatory-related factor contributed to the primary cause of the event)

### **Other Operating Environmental Limitations**

- 9660 Thermal discharge limits – fossil and nuclear
- 9670 Noise limits (not for personnel safety)
- 9680 Fish kill – fossil and nuclear
- 9690 Other miscellaneous operational environmental limits – fossil and nuclear

### **Safety**

- 9700 OSHA-related retrofit or inspection
- 9710 Investigation of possible nuclear safety problems
- 9720 Other safety problems

## **PERSONNEL OR PROCEDURE ERRORS**

- 9900 Operator error
- 9910 Maintenance personnel error
- 9920 Contractor error
- 9930 Operating procedure error

9940 Maintenance procedure error  
9950 Contractor procedure error  
9960 Staff shortage

## **INACTIVE STATES**

0002 Inactive Reserve Shutdown  
9990 Retired unit  
9991 Mothballed unit

## **PERFORMANCE**

9997 NERC Reliability Standard Requirement  
9998 Black start testing  
9999 Total unit performance testing (use appropriate codes for individual component testing)